FIG. 1

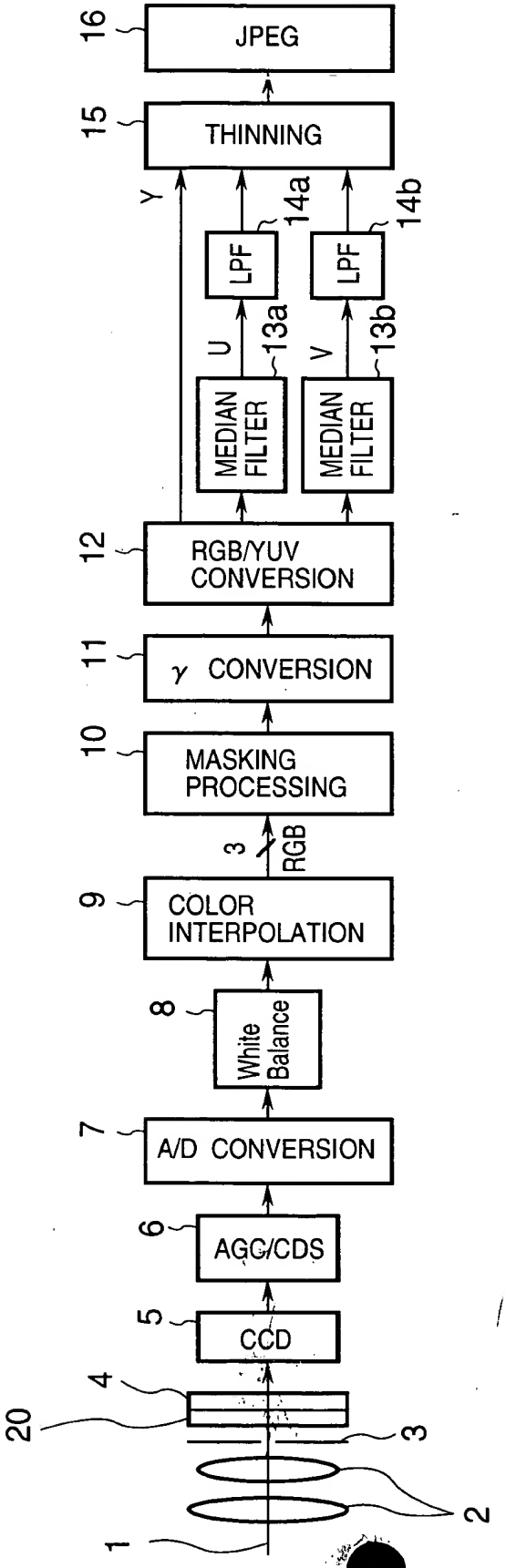

16
JPEG
15
THINNING
Y
14a
14b
LPF
LPF
U
V
13a
13b
MEDIAN FILTER
MEDIAN FILTER
12
RGB/YUV CONVERSION
11
γ CONVERSION
10
MASKING PROCESSING
3
RGB
9
COLOR INTERPOLATION
8
White Balance
7
A/D CONVERSION
6
AGC/CDS
5
CCD
4
20
3
2
1

FIG. 2A

a*11 8	a*12 10	a*13 12
a*21 10	a*22 20	a*23 11
a*31 9	a*32 11	a*33 10

a*22=20

↓ REPLACE

a*22=10 (MEDIAN VALUE)

FIG. 2B

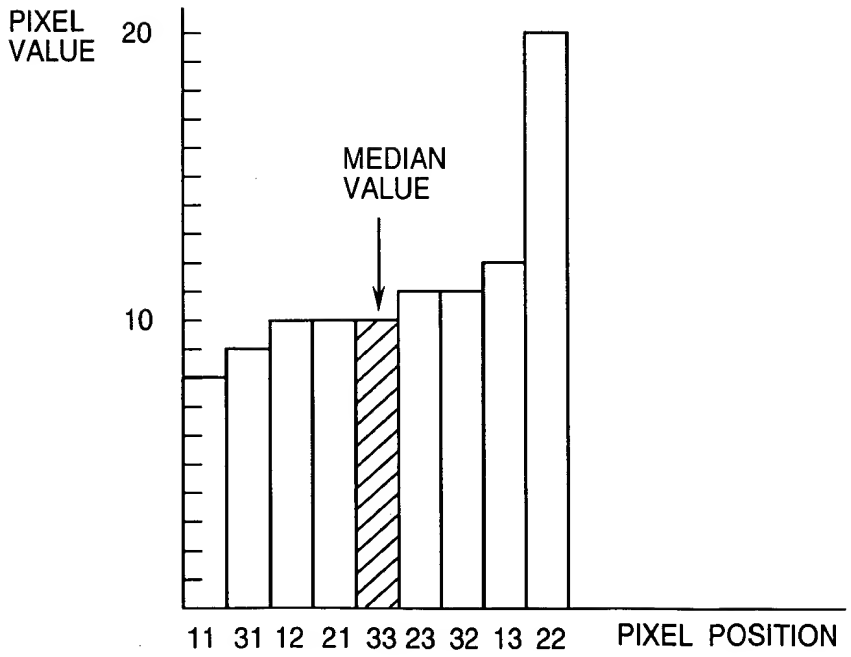


FIG. 3

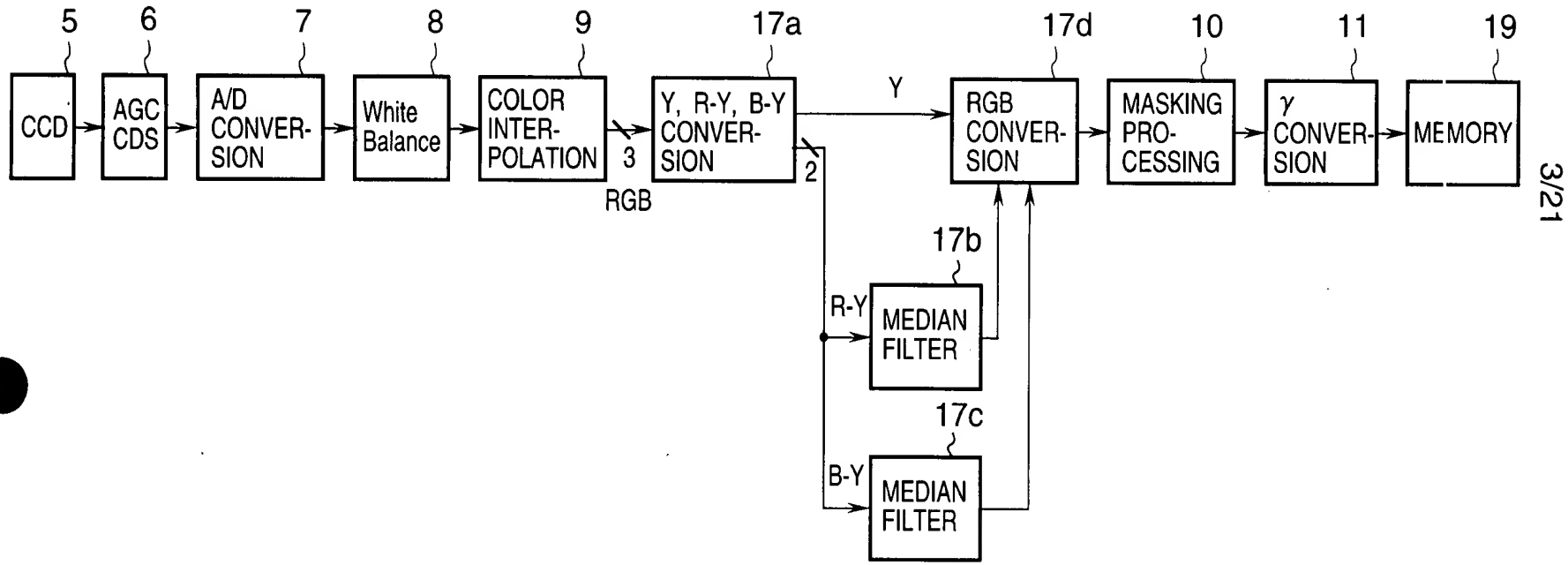

5
6
7
8
9
17a
17d
10
11
19
CCD
AGC CDS
A/D CONVER-SION
White Balance
COLOR INTER-POLATION
3
RGB
Y, R-Y, B-Y CONVER-SION
2
Y
RGB CONVER-SION
MASKING PRO-CESSING
γ CONVER-SION
MEMORY
17b
R-Y
MEDIAN FILTER
17c
B-Y
MEDIAN FILTER

FIG. 4

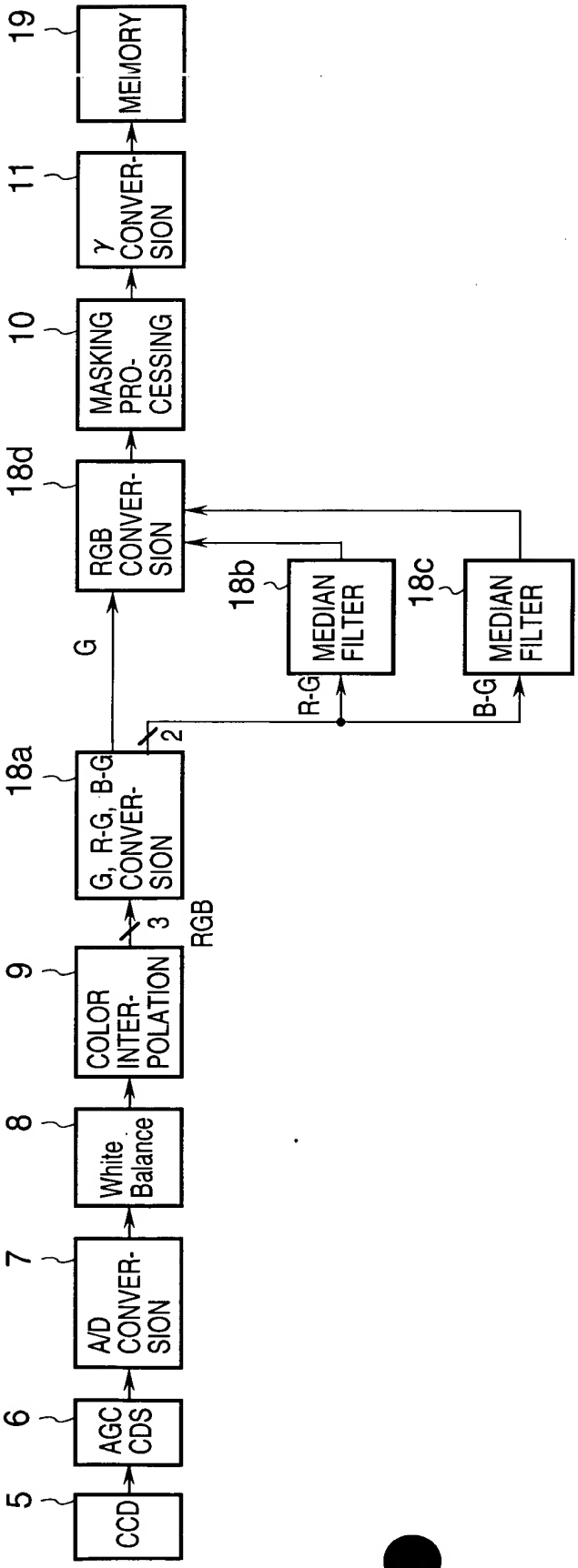

5
CCD
6
AGC CDS
7
A/D CONVER-SION
8
White Balance
9
COLOR INTER-POLATION
3
RGB
18a
G, R-G, B-G CONVER-SION
2
G
R-G
B-G
18b
MEDIAN FILTER
18c
MEDIAN FILTER
18d
RGB CONVER-SION
10
MASKING PRO-CESSING
11
γ CONVER-SION
19
MEMORY

FIG. 5

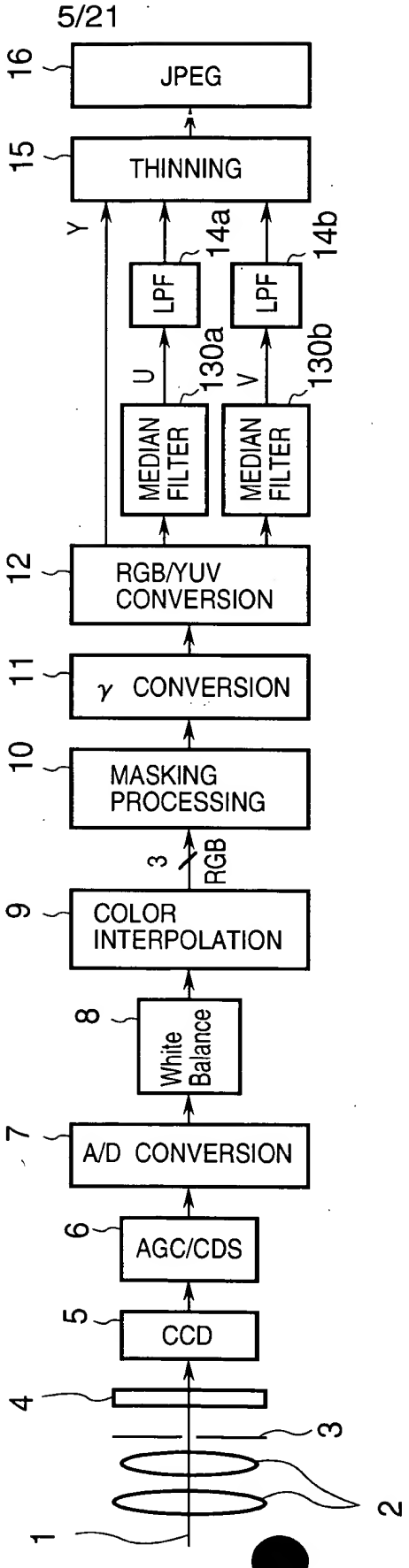

16
JPEG
15
THINNING
Y
14a
14b
LPF
LPF
U
V
130a
130b
MEDIAN FILTER
MEDIAN FILTER
12
RGB/YUV CONVERSION
11
γ CONVERSION
10
MASKING PROCESSING
3
RGB
9
COLOR INTERPOLATION
8
White Balance
7
A/D CONVERSION
6
AGC/CDS
5
CCD
4
3
2
1

FIG. 6

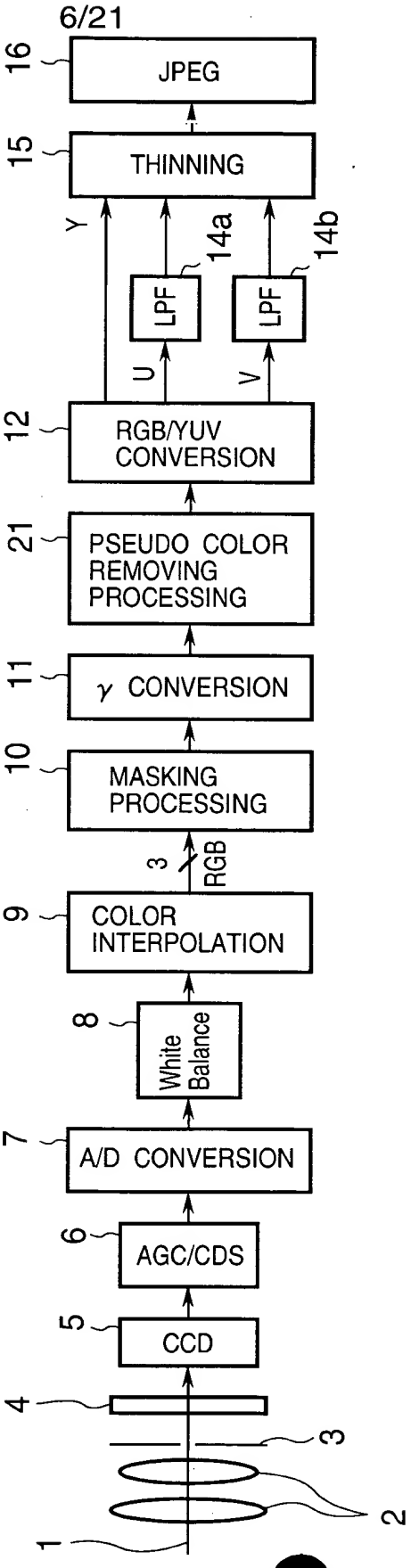

16
JPEG
15
THINNING
Y
14a
LPF
U
14b
LPF
V
12
RGB/YUV CONVERSION
21
PSEUDO COLOR REMOVING PROCESSING
11
γ CONVERSION
10
MASKING PROCESSING
3
RGB
9
COLOR INTERPOLATION
8
White Balance
7
A/D CONVERSION
6
AGC/CDS
5
CCD
4
3
2
1

FIG. 7

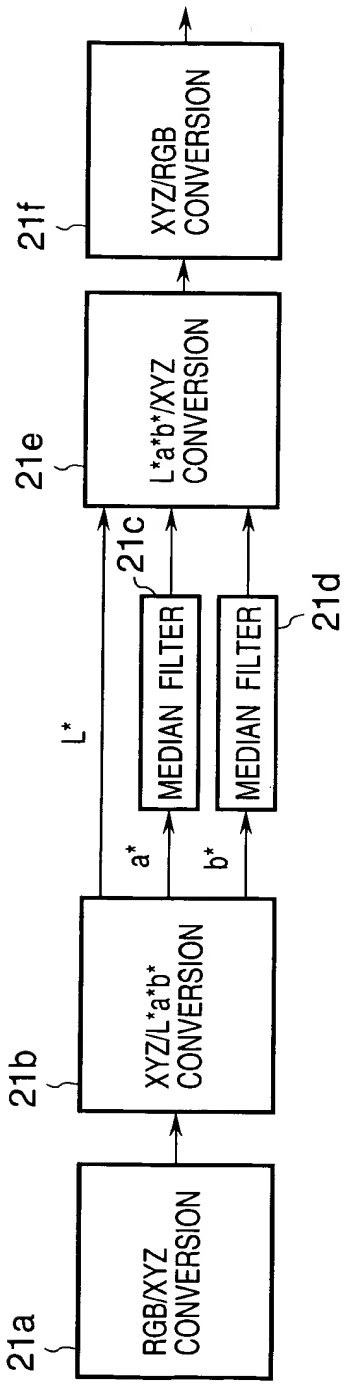

21a
RGB/XYZ CONVERSION
21b
XYZ/L*a*b* CONVERSION
L*
a*
b*
21c
MEDIAN FILTER
21d
MEDIAN FILTER
21e
L*a*b*/XYZ CONVERSION
21f
XYZ/RGB CONVERSION

FIG. 8

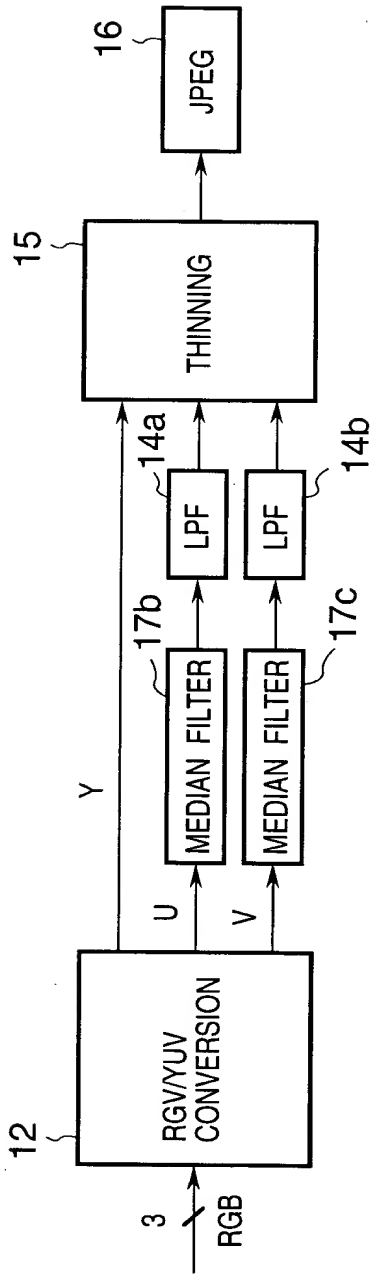

16
JPEG
15
THINNING
14a
LPF
14b
LPF
17b
MEDIAN FILTER
17c
MEDIAN FILTER
Y
U
V
12
RGV/YUV CONVERSION
3
RGB

FIG. 9

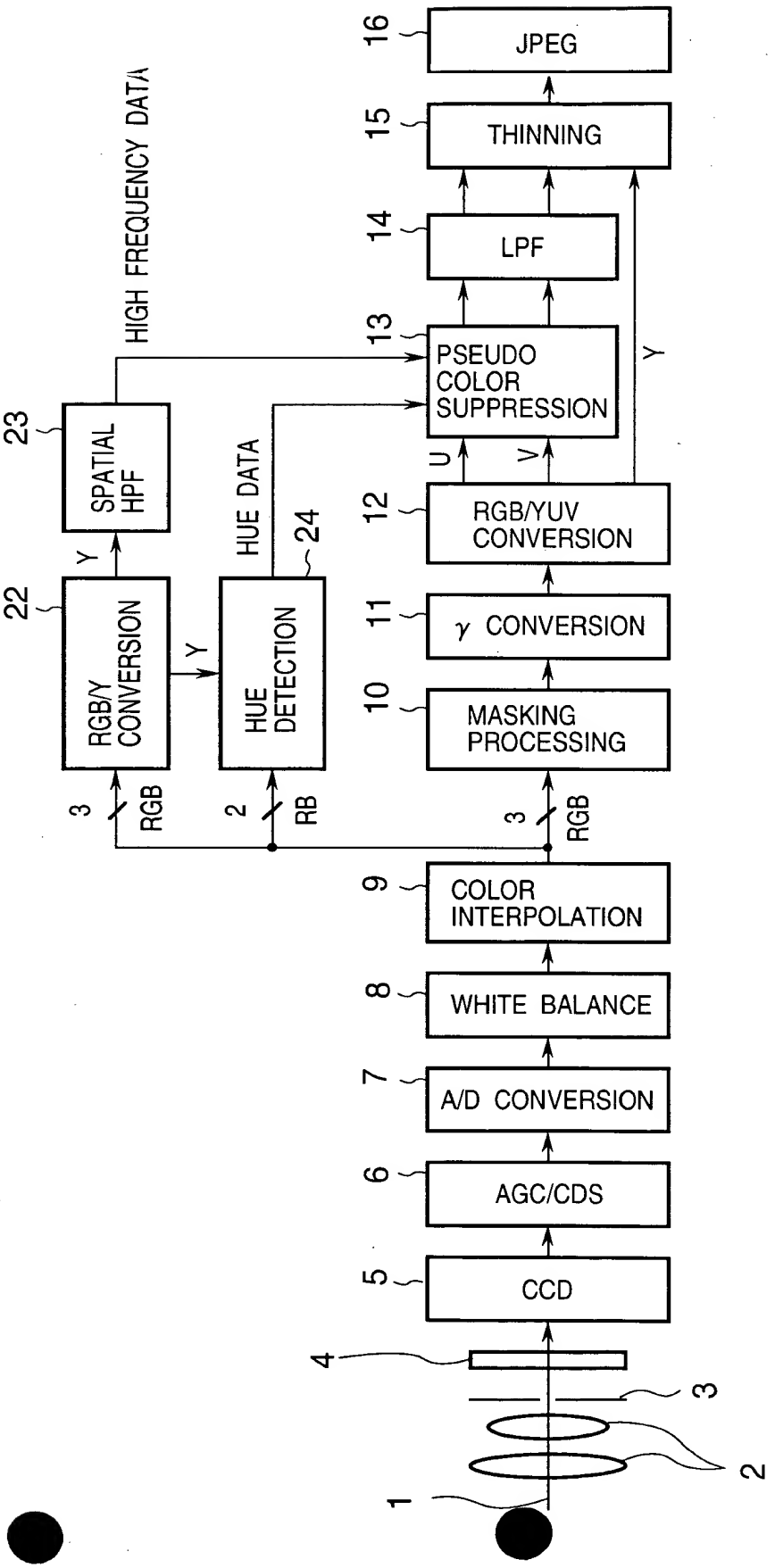

1
2
3
4
5 CCD
6 AGC/CDS
7 A/D CONVERSION
8 WHITE BALANCE
9 COLOR INTERPOLATION
10 MASKING PROCESSING
11 γ CONVERSION
12 RGB/YUV CONVERSION
13 PSEUDO COLOR SUPPRESSION
14 LPF
15 THINNING
16 JPEG
22 RGB/Y CONVERSION
23 SPATIAL HPF
24 HUE DETECTION
HIGH FREQUENCY DATA
HUE DATA
RGB
RB
Y
U
V

FIG. 10

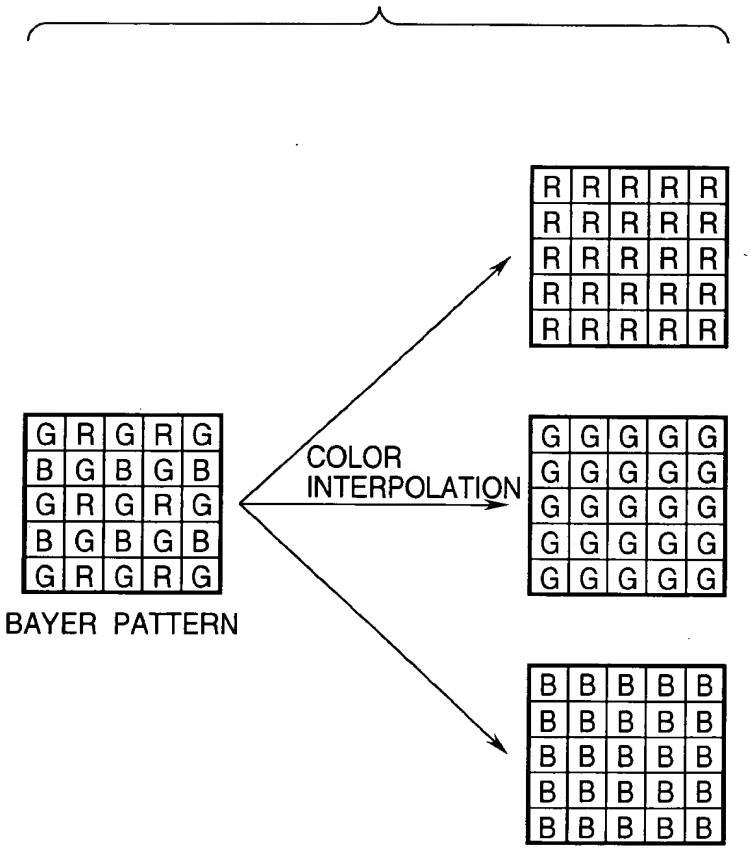

G R G R G
B G B G B
G R G R G
B G B G B
G R G R G
BAYER PATTERN
COLOR INTERPOLATION
R R R R R
R R R R R
R R R R R
R R R R R
R R R R R
G G G G G
G G G G G
G G G G G
G G G G G
G G G G G
B B B B B
B B B B B
B B B B B
B B B B B
B B B B B

FIG. 11

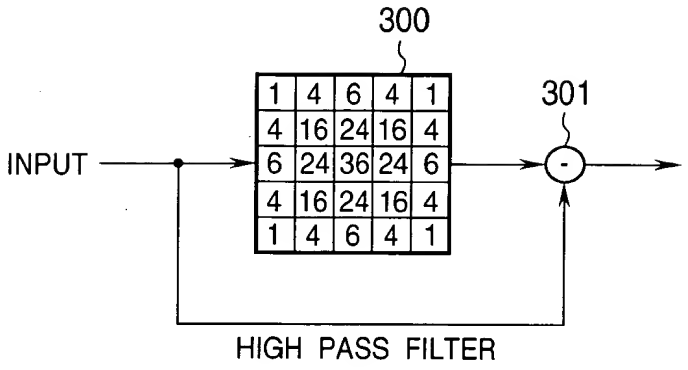

300
301
INPUT
1 4 6 4 1
4 16 24 16 4
6 24 36 24 6
4 16 24 16 4
1 4 6 4 1
-
HIGH PASS FILTER

FIG. 12

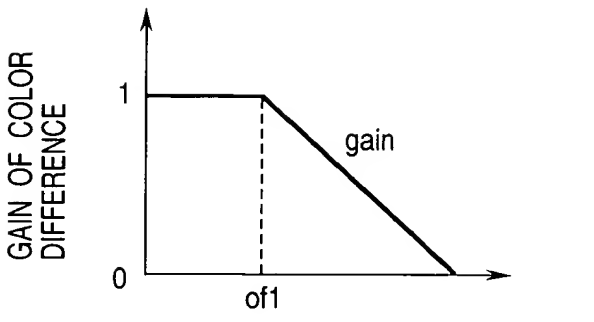

GAIN OF COLOR DIFFERENCE
1
0
gain
of1
ABSOLUTE VALUE OF HPF OUTPUT

FIG. 13

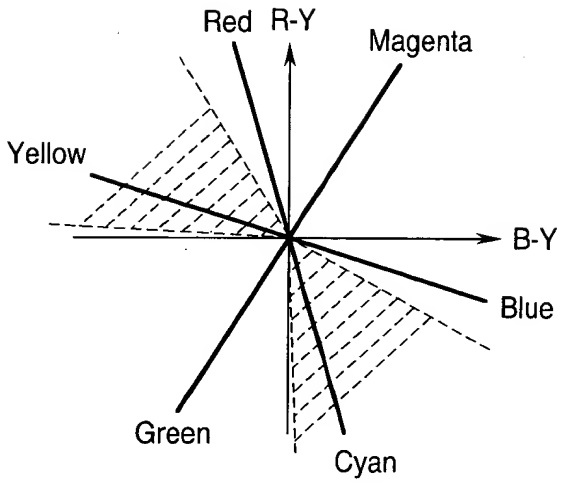


FIG. 14

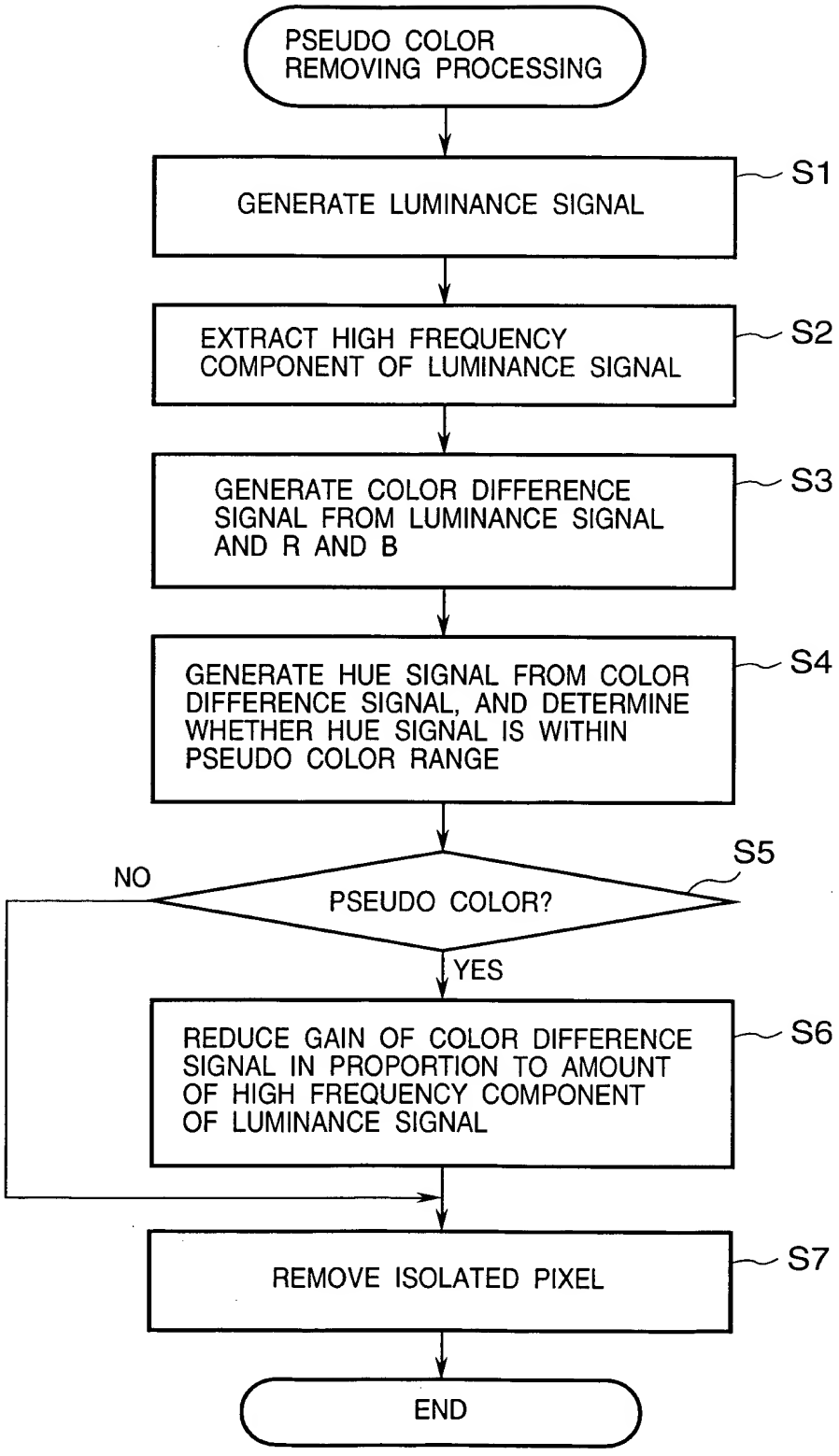

PSEUDO COLOR REMOVING PROCESSING
GENERATE LUMINANCE SIGNAL
S1
EXTRACT HIGH FREQUENCY COMPONENT OF LUMINANCE SIGNAL
S2
GENERATE COLOR DIFFERENCE SIGNAL FROM LUMINANCE SIGNAL AND R AND B
S3
GENERATE HUE SIGNAL FROM COLOR DIFFERENCE SIGNAL, AND DETERMINE WHETHER HUE SIGNAL IS WITHIN PSEUDO COLOR RANGE
S4
PSEUDO COLOR?
S5
NO
YES
REDUCE GAIN OF COLOR DIFFERENCE SIGNAL IN PROPORTION TO AMOUNT OF HIGH FREQUENCY COMPONENT OF LUMINANCE SIGNAL
S6
REMOVE ISOLATED PIXEL
S7
END

FIG. 15

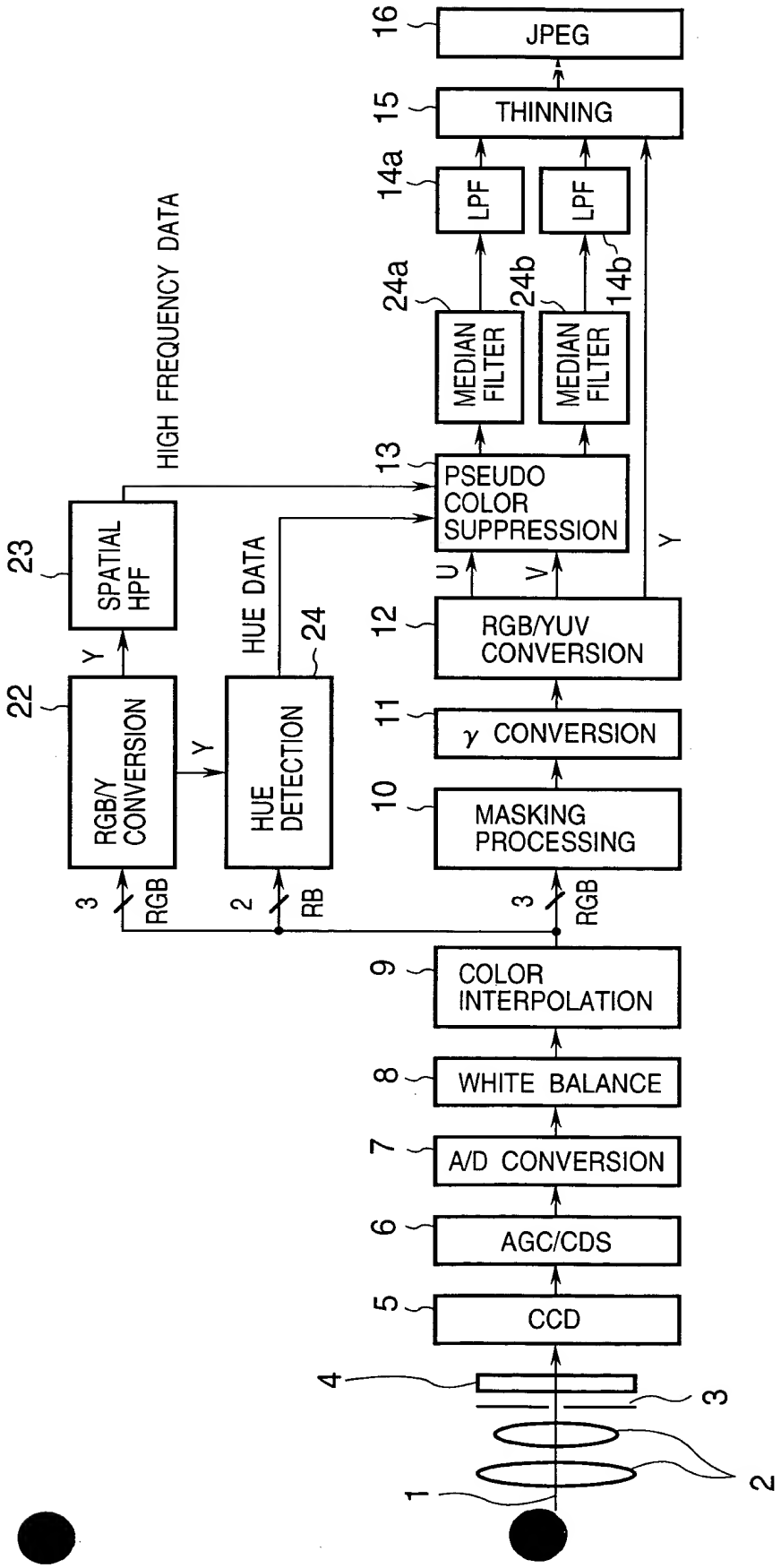

1
2
3
4
5 CCD
6 AGC/CDS
7 A/D CONVERSION
8 WHITE BALANCE
9 COLOR INTERPOLATION
10 MASKING PROCESSING
11 γ CONVERSION
12 RGB/YUV CONVERSION
13 PSEUDO COLOR SUPPRESSION
14a LPF
14b LPF
15 THINNING
16 JPEG
22 RGB/Y CONVERSION
23 SPATIAL HPF
24 HUE DETECTION
24a MEDIAN FILTER
24b MEDIAN FILTER
HIGH FREQUENCY DATA
HUE DATA
RGB
RB
Y
U
V

FIG. 16

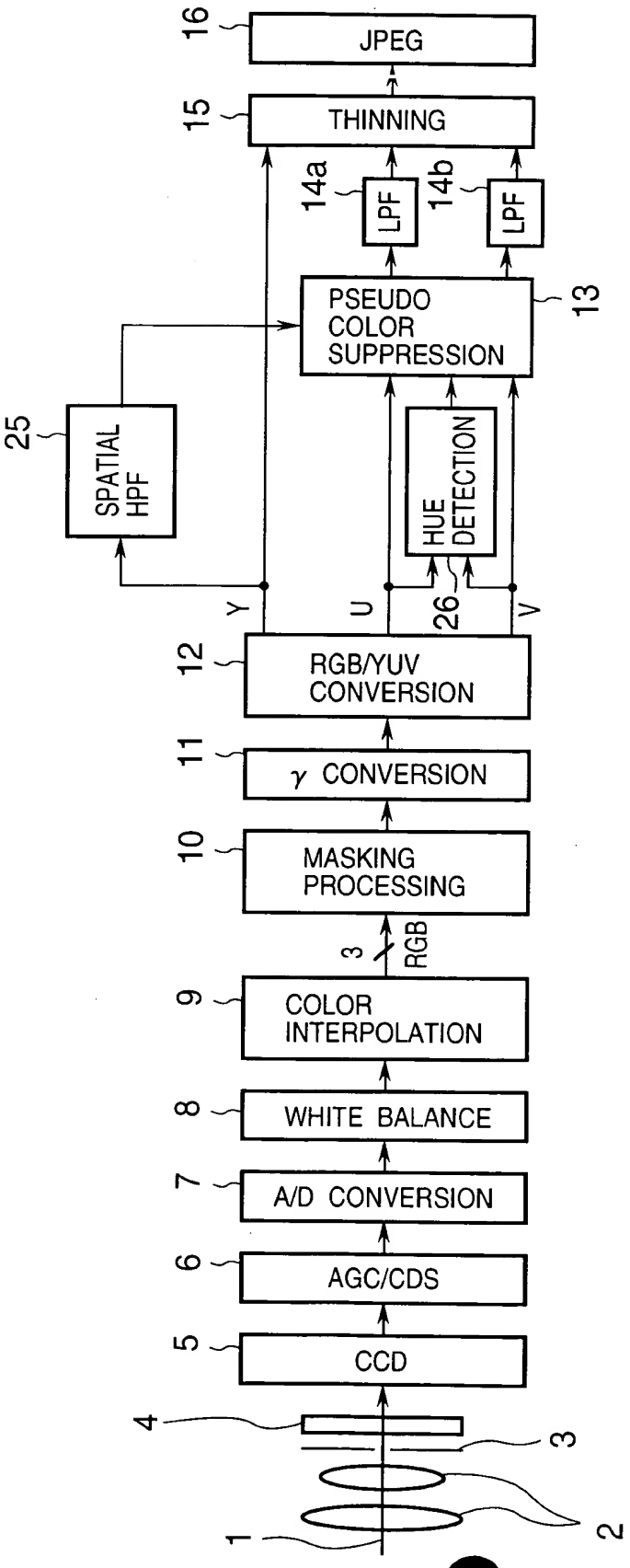

16
JPEG
15
THINNING
14a
LPF
14b
LPF
PSEUDO COLOR SUPPRESSION
13
25
SPATIAL HPF
HUE DETECTION
Y
U
26
V
12
RGB/YUV CONVERSION
11
γ CONVERSION
10
MASKING PROCESSING
3
RGB
9
COLOR INTERPOLATION
8
WHITE BALANCE
7
A/D CONVERSION
6
AGC/CDS
5
CCD
4
3
1
2

FIG. 17

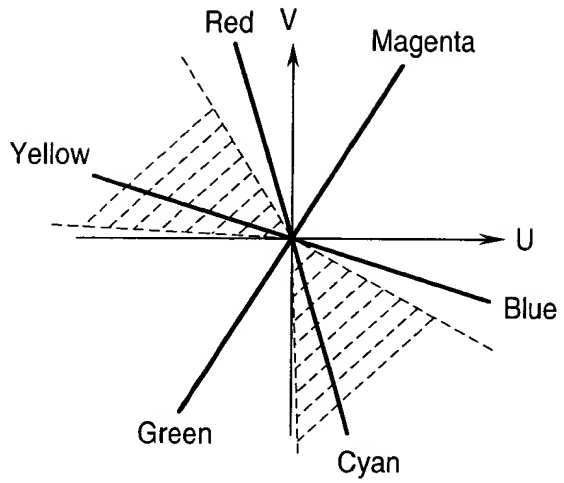


FIG. 18

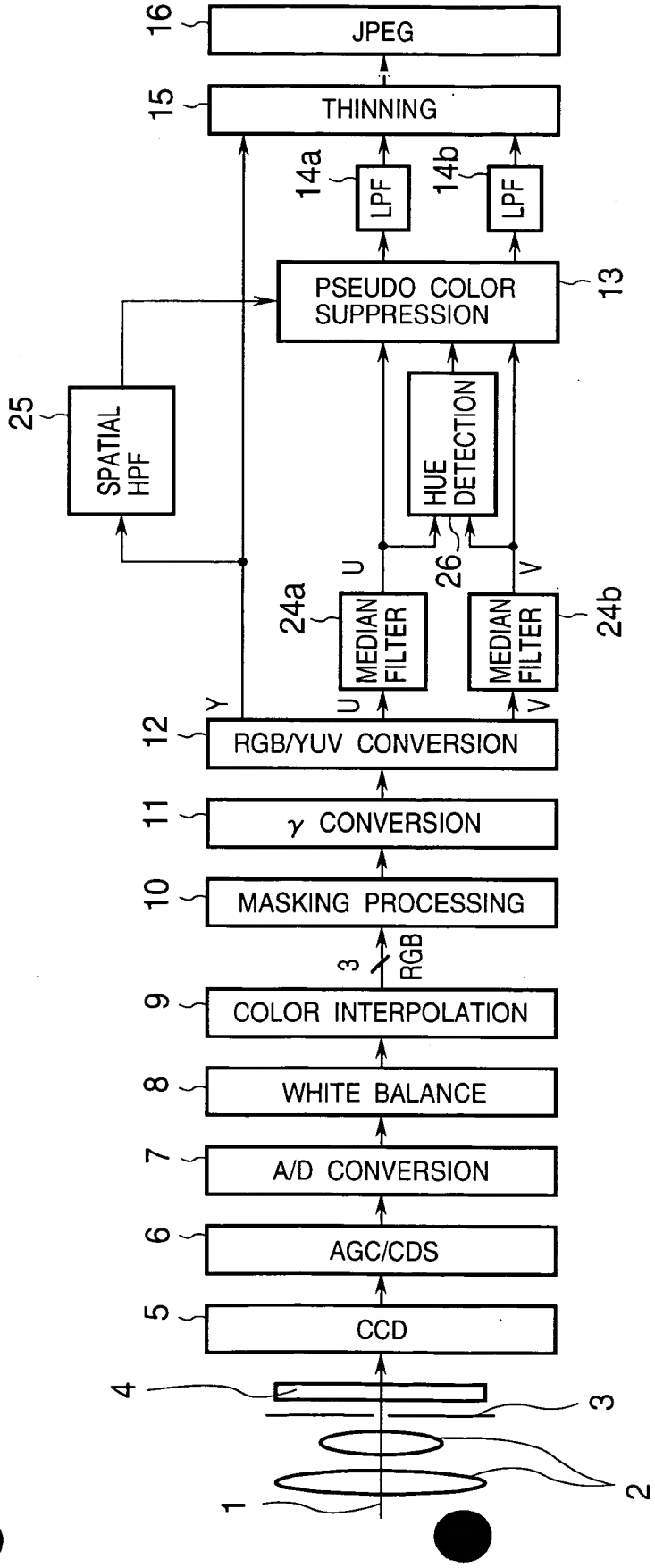
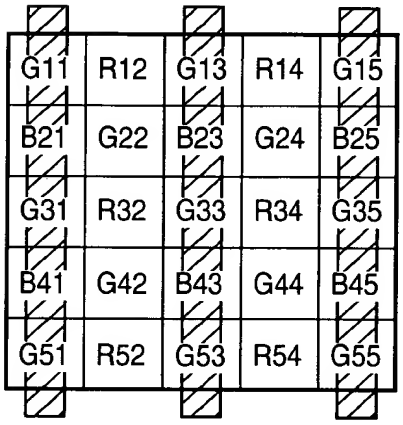

16
JPEG
15
THINNING
14a
LPF
14b
LPF
PSEUDO COLOR SUPPRESSION
13
25
SPATIAL HPF
HUE DETECTION
26
24a
MEDIAN FILTER
24b
MEDIAN FILTER
U
V
Y
12
RGB/YUV CONVERSION
11
γ CONVERSION
10
MASKING PROCESSING
3
RGB
9
COLOR INTERPOLATION
8
WHITE BALANCE
7
A/D CONVERSION
6
AGC/CDS
5
CCD
4
3
2
1

FIG. 19



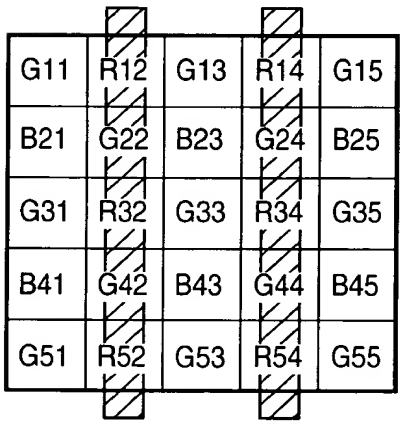
R33 = (R32 + R34) /2
G33 = 0
B33 = (B23 + B43) /2 = 0 ⇨ Red

R43 = (R32 + R34 + R52 + R54) /4
G43 = (G33 + G53) /2 = 0
B43 = 0 ⇨ Red

R34 = R34
G34 = (G24 + G33 + G35 + G44) /4
B34 = (B22 + B25 + B43 + B44) /4 = 0 ⇨ Yellow

R44 = (R34 + R54) /2
G44 = G44
B44 = (B43 + B44) /2 = 0 ⇨ Yellow

FIG. 20



R33 = (R32 + R34) /2 = 0
G33 = G33
B33 = (B23 + B43) /2 ⇨ Cyan

R43 = (R32 + R34 + R52 + R54) /4 = 0
G43 = (G33 + G53) /2
B43 = B43 ⇨ Cyan

R34 = 0
G34 = (G24 + G44) /2 = 0
B34 = (B23 + B25 + B43 + B45) /4 ⇨ Blue

R44 = (R34 + R54) /2 =0
G44 = 0
B44 = (B43 + B45) /2 ⇨ Blue

FIG. 21

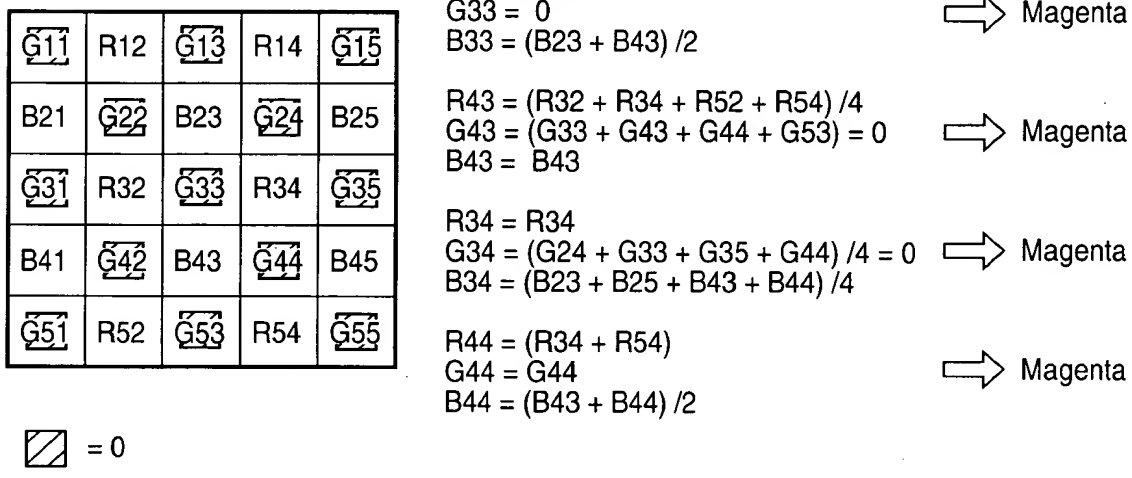
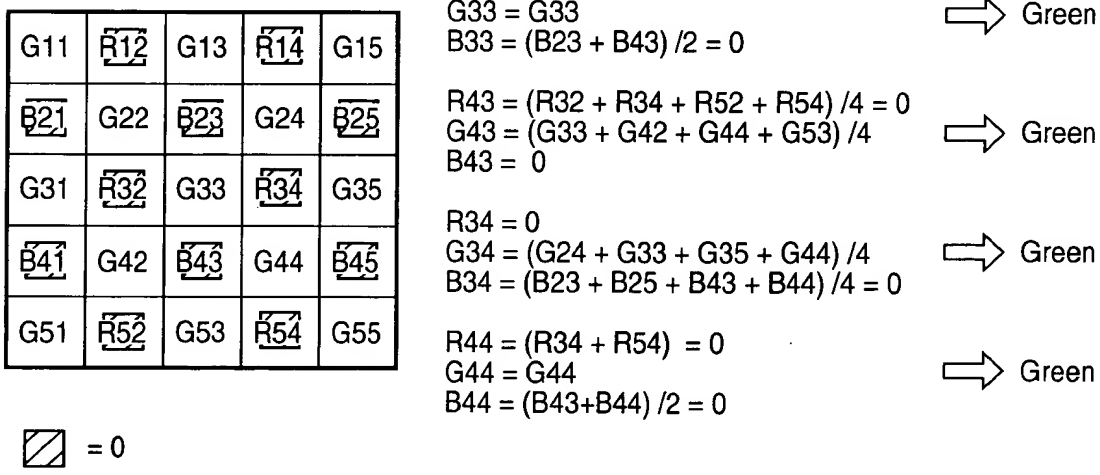

G11 R12 G13 R14 G15
B21 G22 B23 G24 B25
G31 R32 G33 R34 G35
B41 G42 B43 G44 B45
G51 R52 G53 R54 G55
= 0
R33 = (R32 + R34) /2 = 0
G33 = 0
B33 = (B23 + B43) /2
Magenta
R43 = (R32 + R34 + R52 + R54) /4
G43 = (G33 + G43 + G44 + G53) = 0
B43 = B43
Magenta
R34 = R34
G34 = (G24 + G33 + G35 + G44) /4 = 0
B34 = (B23 + B25 + B43 + B44) /4
Magenta
R44 = (R34 + R54)
G44 = G44
B44 = (B43 + B44) /2
Magenta

FIG. 22


G11 R12 G13 R14 G15
B21 G22 B23 G24 B25
G31 R32 G33 R34 G35
B41 G42 B43 G44 B45
G51 R52 G53 R54 G55
= 0
R33 = (R32 + R34) /2 = 0
G33 = G33
B33 = (B23 + B43) /2 = 0
Green
R43 = (R32 + R34 + R52 + R54) /4 = 0
G43 = (G33 + G42 + G44 + G53) /4
B43 = 0
Green
R34 = 0
G34 = (G24 + G33 + G35 + G44) /4
B34 = (B23 + B25 + B43 + B44) /4 = 0
Green
R44 = (R34 + R54) = 0
G44 = G44
B44 = (B43+B44) /2 = 0
Green